

## Two Cretaceous Nautiloids from Baja California, Mexico, and Southern California

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*Abstract.*—Two cretaceous nautiloids from Baja California, Mexico, and southern California by Frederick A. Sundberg. *Bull. Southern California Acad. Sci.*, 83(1):43-52, 1984. Two genera of nautiloids not previously reported from the Western Hemisphere are present in the Cretaceous of Baja California, Mexico, and southern California. *Eucymatoceras* sp. is from the Alisitos Formation (Aptian-Albian) near Arroyo El Rosario. *Anglonutilus catarinae* n. sp. is from the Rosario Group (Maastrichtian) of Santa Catarina Landing, Baja California, and Carlsbad, California, and the Williams Formation (late Campanian to early Maastrichtian) of the Santa Ana Mountains, California.

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Marine Cretaceous deposits of Baja California, Mexico, contain an abundant molluscan fauna, but the occurrence of nautiloids has received only brief notice in the literature (Burckhardt 1930; Anderson and Hanna 1935; Allison 1955; Anderson 1958). Two specimens of *Eucymatoceras* sp. were collected by E. C. Allison from the Aptian-Albian Alisitos Formation near Arroyo El Rosario, Mexico. Eleven specimens here described as *Anglonutilus catarinae* n. sp. have been collected from the Maastrichtian Rosario Group near the Santa Catarina Landing, Mexico. *A. catarinae* is also present in the Rosario Group at Rio del Rosario, Punta Cabra, and Punta San Jose, Mexico and Carlsbad, California and the Campanian Williams Formation, Santa Ana Mountains, California (Fig. 1). These occurrences of the genera *Eucymatoceras* and *Anglonutilus* are the first reported for the Western Hemisphere.

The following abbreviations are used:

- CAS = California Academy of Science, San Francisco
- LACMIP = Los Angeles County Museum, Invertebrate Paleontology
- UCLA = University of California, Los Angeles
- UCMP = University of California, Museum of Paleontology, Berkeley.

### Systematic Paleontology

- Order Nautiloidea Agassiz, 1847
- Superfamily Nautilaceae de Blainville, 1825
- Family Cymatoceratidae Spath, 1927
- Genus *Eucymatoceras* Spath, 1927
- Type Species: *Nautilus plicatus* Fitton (1935)

The genus *Eucymatoceras* is a cymatocerid typified by a subglobular, involute conch with a slightly sinuous suture and prominent V-shaped ribs on the ventral and whorl sides (Kummel 1964:K454). Kummel (1956, 1964) reports the genus only from the Lower Cretaceous of Europe, but the specimens described below, from the Alisitos Formation of Baja California, Mexico, extend the geographic range to the Western Hemisphere.

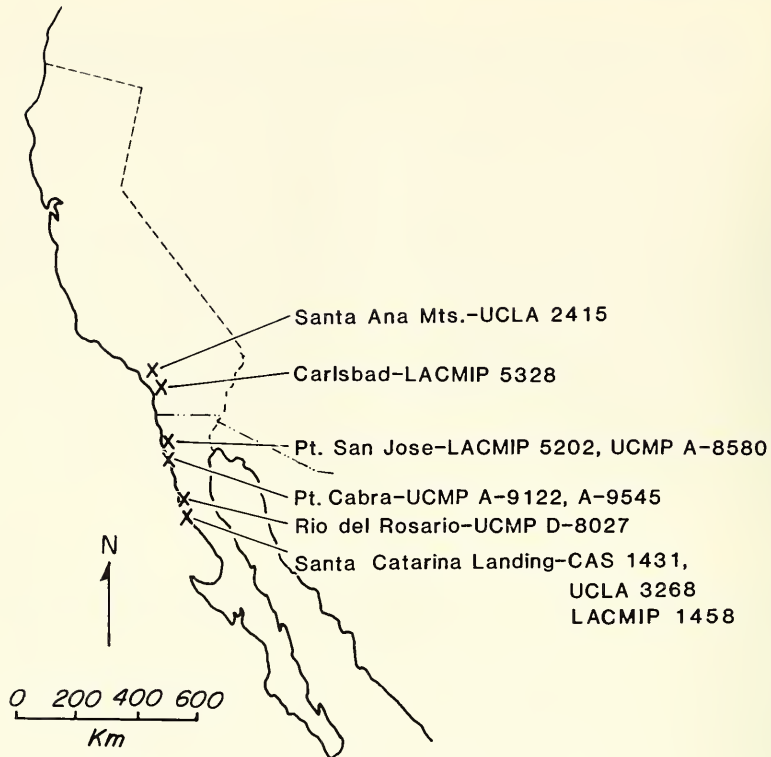


Fig. 1. Cretaceous localities in Baja California and California yielding the nautiloid samples discussed in text.

*Eucymatoceras* sp.

Text-figure 2

*Discussion.*—Two poorly preserved fragmental specimens of *Eucymatoceras* sp. show the characteristic conch shape and the ventral V-shaped ribs of the genus, but the V-shaped ribs are not apparent on the whorl sides. The suture appears to be slightly sinuous; the conch is large, involute, and rapidly expanding; and the siphuncle is subcentral.

*Occurrence.*—*Eucymatoceras* sp. occurs in the Alisitos Formation near Arroyo El Rosario, Baja California, Mexico (UCMP loc. D-8027).

*Range.*—The Alisitos Formation ranges in age from Aptian to Albian (Allison 1955).

*Types.*—Hypotypes UCMP 14687–14688 from UCMP loc. D-8027.

Genus *Anglonautilus* Spath, 1927

Type Species: *Nautilus undulatus* Sowerby (1813)

The genus *Anglonautilus* is a cymatocerid typified by large fold-like undulations on the venter that decrease rapidly on the flanks, sutures with shallow ventral and lateral lobes, and a subcentral siphuncle (Kummel 1964:K453). *Anglonautilus* has been previously reported only from beds of Hauterivian to Cenomanian age

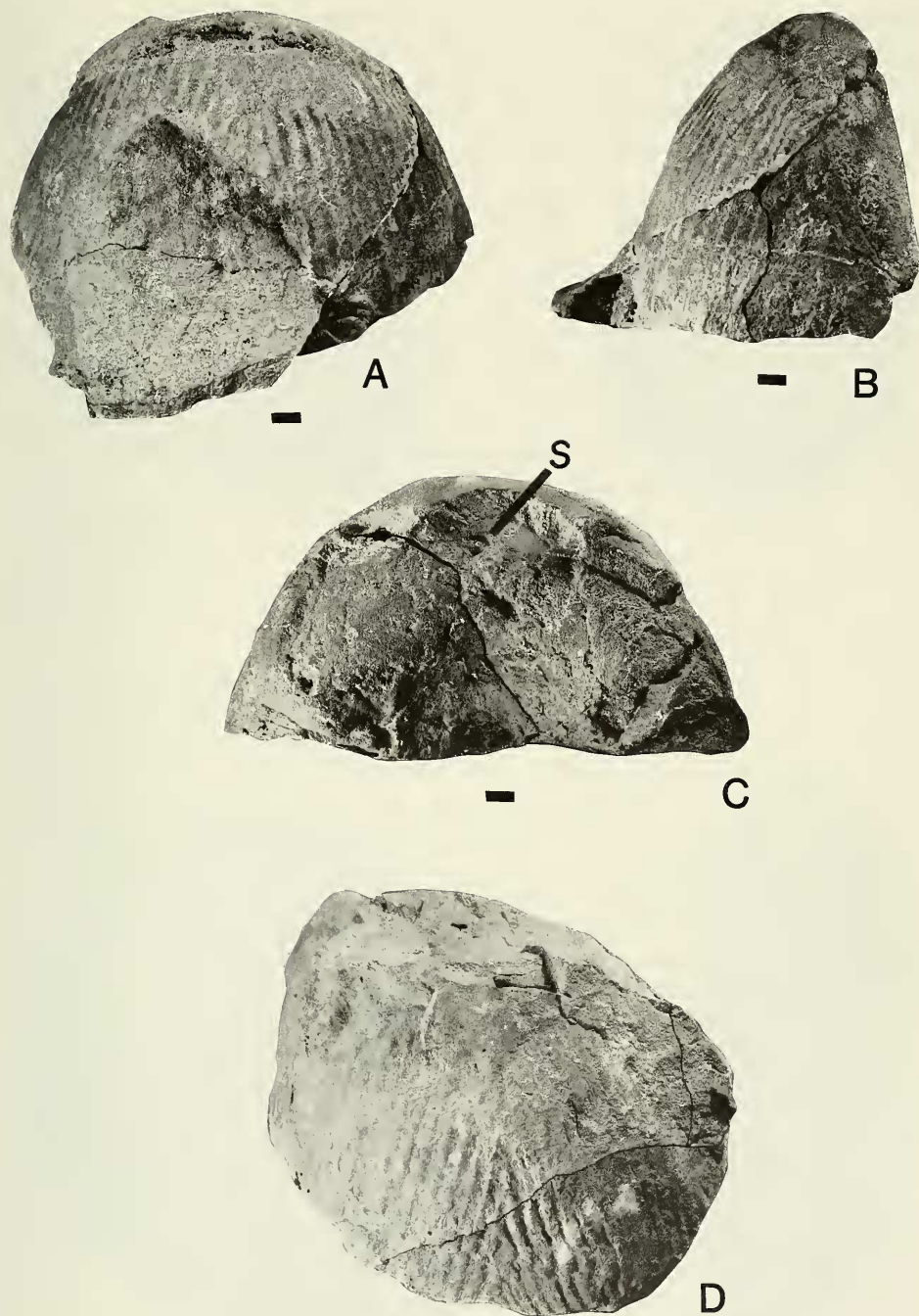


Fig. 2. *Eucymatoceras* sp., Arroyo El Rosario, Baja California, Mexico (UCMP loc. D-8027). Bar = 1 cm. (A–C) Hypotype UCMP 14687, (A) ventral view, (B) lateral view, and (C) dorsal view. S = siphuncle. (D) Hypotype UCMP 14688, ventral view.

in Europe (Kummel 1956, 1964) and Cenomanian age in Japan (Matsumoto and Takahashi 1982); the specimens from Baja California and California extend the geologic range to early Maastrichtian and the geographic distribution into the Western Hemisphere. In California *Anglonutilus* occurs in upper Campanian to lower Maastrichtian beds and in Baja California only in lower Maastrichtian beds.

*Anglonutilus catarinae* n. sp.

Text-figures 3–5

*Diagnosis.*—Ventral fold-like undulations present during brief growth period, 5.0 cm to approximately 8.3 cm in whorl height. Suture of high relief for genus.

*Description.*—Conch large, involute, and compressed. Whorl cross-section subquadrate to compressed, widest diameter two-thirds of whorl height from venter. Without shell, one-eighth of earlier whorl visible in umbilicus. Broad fold-like undulations present on venter in later growth stages (appearing at approximately 5.0 cm in whorl height and disappearing at approximately 8.3 cm in whorl height). Ventral undulations with a wavelength of approximately 3 cm and height of 3 to 4 mm. Living chamber occupying one-third of last whorl. Suture comprised of small, narrow saddle near umbilical shoulder, broad, relatively deep lateral lobe, relatively high, broad lateral saddle, and very shallow ventral lobe(?) (Fig. 4). Suture flatted in specimens having whorl height in excess of 11 cm. Siphuncle subcentral dorsally.

*Occurrence.*—*Anglonutilus catarinae* is abundant in lower Maastrichtian beds of the Rosario Group near Santa Catarina Landing, Baja California, Mexico (UCLA loc. 3268, type locality, CAS 1431). In Baja California, it is also found south of Punta San Jose (LACMIP loc. 5202 and UCMP loc. A-8580) and at Punta Cabras (UCMP loc. A-9122 and A-9545) in the Rosario Group. *A. catarinae* also occurs in California in the Williams Formation at Bee Canyon, Santa Ana Mountains, Orange County (UCLA loc. 2415) and Point Loma Formation of the Rosario Group at Carlsbad, San Diego County (LACMIP loc. 5328).

*Discussion.*—Cymatocerid nautiloids are divided into genera based on surface ornamentation and the genus *Anglonutilus* is typified by laterally discontinuous venter folds, as discussed above. The author includes *Anglonutilus catarinae* into this genus because of the presence of moderately well preserved ventral folds on a few specimens (UCLA 58175, 58181, and 58187 and LACMIP 5750) and suture similarity with other species of *Anglonutilus*. The absence of the ventral folds on other specimens assigned to *A. catarinae* is due to 1) abrasion of the venter or entire specimen, the folds are shallow and easily distorted or removed, 2) poor preservation, and 3) the folds are only present during a brief growth period, of approximately 180° of a whorl in the older, larger specimens. *A. catarinae* differs primarily from the other named species in the ventral folds brief occurrence, approximately 180° as opposed to 225° or greater whorl distances, and its relatively high suture relief.

*Anglonutilus catarinae* occurs in an unusual abundance at the type locality in Mexico (UCLA loc. 3268) from whence 17 specimens were obtained for study. These specimens and others from Mexico and California show a variation in aperture height and width in specimens with whorl height greater than 7 cm (Fig. 4, 5). This aperture shape variation is similar to that of the recent *Nautilus*, which,



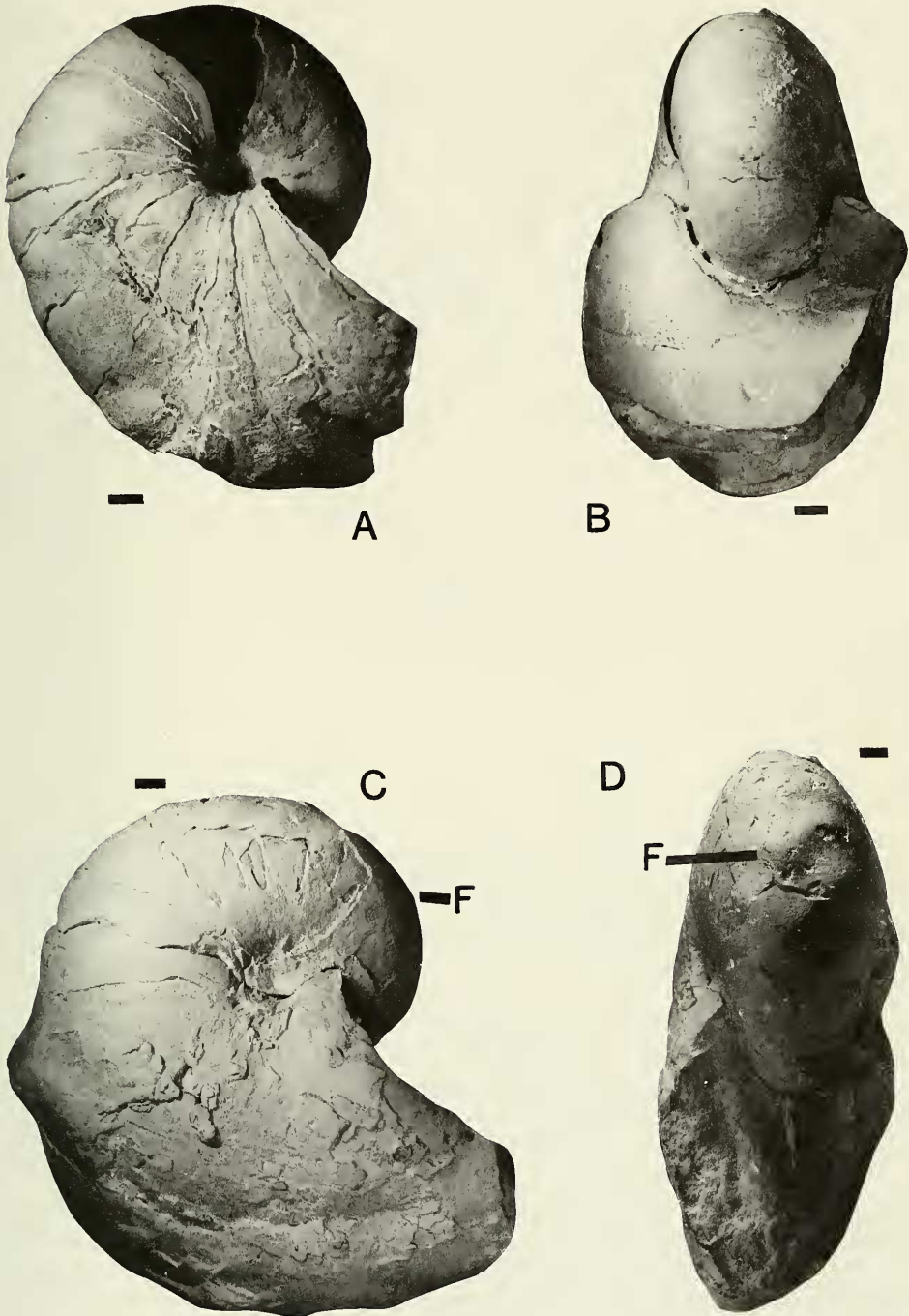


Fig. 3. *Anglonutilus catarinae* n. sp., Santa Catarina Landing, Baja California, Mexico (UCLA loc. 3268). Bar = 1 cm. (A, B) Holotype UCLA 58184, (A) lateral and (B) ventral views. (C, D) Paratype UCLA 58181, (C) lateral and (D) ventral views. F = ventral fold-like undulations.

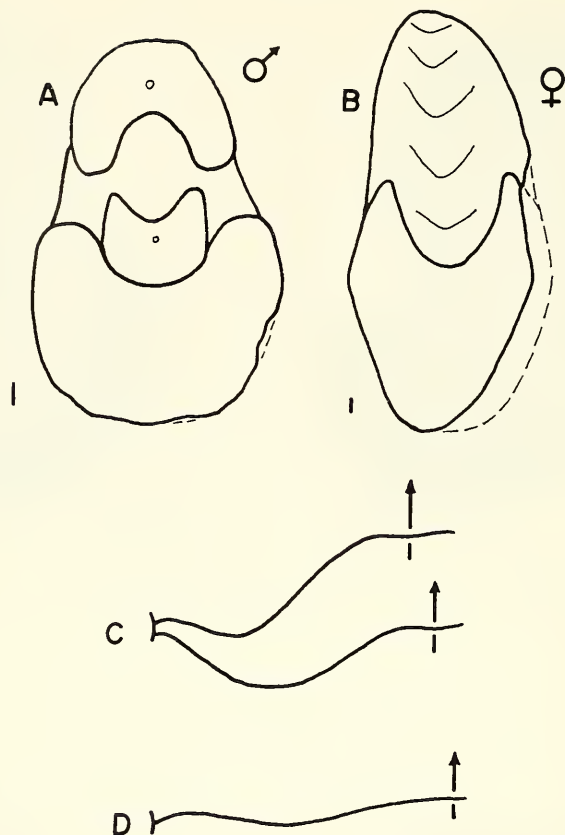


Fig. 4. Anterior views and suture of *Anglonautilus catarinae* n. sp. (A, B, C) and suture of *Anglonautilus* sp. (D). A) Paratype UCLA 58177, male; B) Paratype UCLA 58181, female; C) Sutures of holotype UCLA 58184; D) Suture of UCLA 58430. A, B, and C. are from Santa Catarina Landing, Baja California (Maastrichtian). D is from the Santa Ana Mountains (Turonian). Bar = 1 cm.

in *Nautilus*, is a sexually derived character (Sanders and Spinosa 1978). The aperture shape variation in *A. catarinae* may also be due to sexual dimorphism.

Several authors have briefly commented on the presence of nautiloids from the Rosario Group in Baja California, Mexico. Burckhardt (1930) was the first published note on the occurrence of nautiloids, but neither he nor later authors figured any Baja California specimens. Burckhardt's specimens were not relocated for this study. Anderson and Hanna (1935) and later Anderson (1958:65) provided a brief discussion or mention of the nautiloids from Santa Catarina Landing (CAS loc. 1431). Anderson and Hanna (1935:25) referred to the nautiloids as *Nautilus campbelli* Meek and *N. cf. d'orbignyanus* Forbes; Anderson (1958:65) later referred to them as *Cymatoceras* (?) *campbelli* (Meek). Inspection of the specimens from CAS loc. 1431 by the author shows that *A. catarinae* is present in the collection. Allison (1955:403) reported *Eutrephoceras* sp. from UCMP loc. A-8580; upon inspection of this locality collection *A. catarinae* was also identified. Thus the various nautiloid taxon reported by these authors are probably assignable to *A. catarinae* based on the species present in the referred locality assemblage.

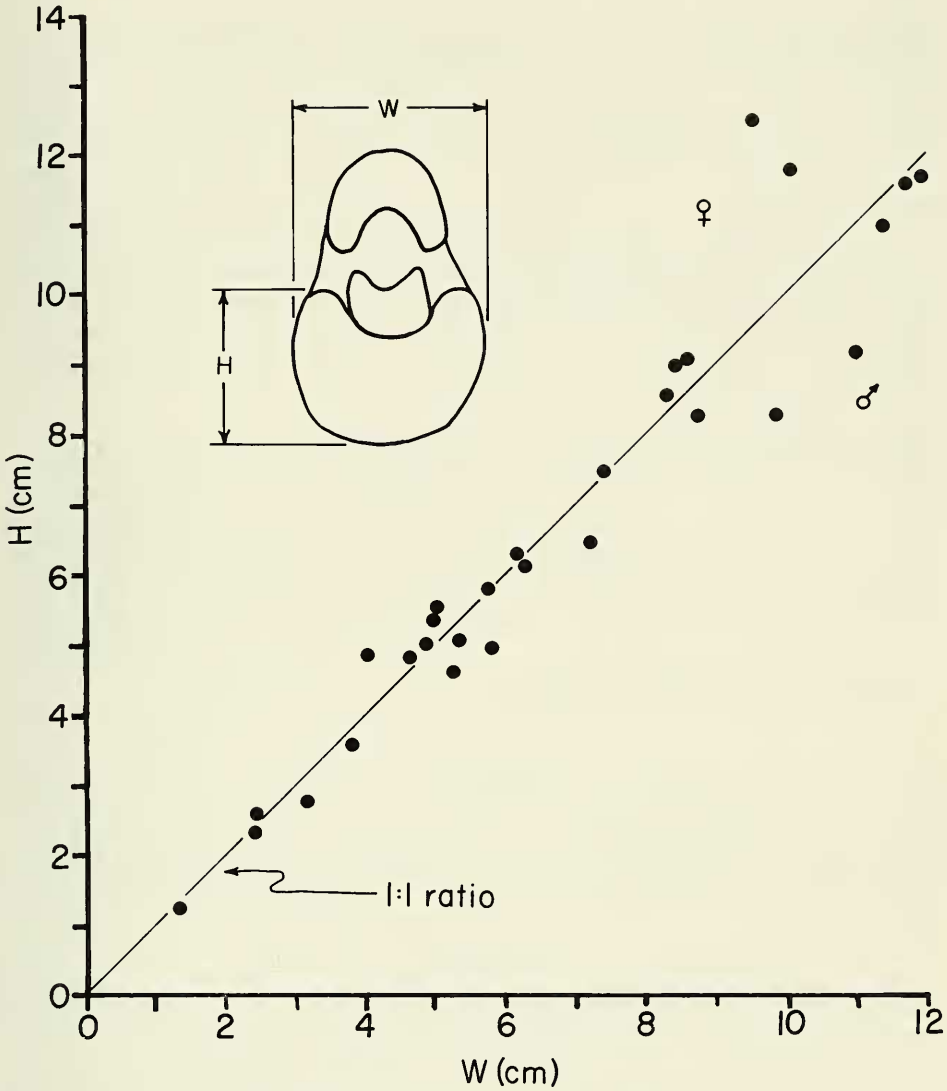


Fig. 5. Graph of height (H) and width (W) ratios for *Anglonautilus catarinae* n. sp. showing sexual dimorphism of later growth stages.

Another unnamed species of *Anglonautilus* occurs in various localities in southern California. This species differs from *A. catarinae* in that the former has less curvature to the suture (Fig. 4), and umbilical plug, and weak development of the ventral folds diagnostic of the genus. Thus *Anglonautilus* sp. occurs in sediments of Turonian to Campanian age.

Four previously named species of *Anglonautilus* are known from England, Europe, or Japan. *Anglonautilus catarinae* is most similar to *A. japonicus* Matsumoto and Takahashi (1982) from the lower Cenomanian of Japan in overall shape but differs in the latter's more numerous and relatively laterally persistent ventral fold-like undulations, the clioscapitoid shape of the adult shell, shallow

median groove on the venter and less sinuous suture. *A. subalbensis* (Sinzow 1913) from Albian beds in Crimea differs from *A. catarinae* in that the former has more abundant ventral undulations (persistent over a longer growth period), widest diameter one-third of whorl height from venter, a slight clioscapitoid shape to the adult shell, and a more shallow lateral lobe and lateral saddle. *A. undalatus* (Sowerby 1813) from the Aptian to Cenomanian deposits of England and various localities in Europe (Foord 1891; Kummel 1956) differs from *A. catarinae* in that the former has more quadrate whorl section, shallower suture and more numerous ventral undulations which are persistent laterally. *A. begudensis* (Kilian and Reboul 1915) from the Hauterivian of France has, for the genus, the greatest lateral persistence of the ventral undulations. *A. begudensis* differs from *A. catarinae* in this lateral persistence and in having more numerous ventral undulations.

*Range.*—*Anglonautilus catarinae* is associated with *Neodemoceras catarinae* (Anderson and Hanna) at its type locality. *Neodemoceras catarinae* is of early Maastrichtian age (Popenoe *et al.* 1960), and provides an early Maastrichtian age for the occurrence of *A. catarinae* in Baja California. The occurrence of the species at the Carlsbad locality (LACMIP loc. 5328) is late Campanian or early Maastrichtian based on co-occurring faunas (Sundberg 1981). The Santa Ana Mountains (UCLA loc. 2415) specimens occur in late Campanian to earliest Maastrichtian (Matsumoto 1960; Popenoe *et al.* 1960). The range of *A. catarinae* is thus late Campanian to early Maastrichtian.

*Types.*—Holotype UCLA 58184 from UCLA loc. 3268; Paratypes UCLA 58175–18183, 58185–58186 all from UCLA loc. 3268; UCLA 58187–58189 from UCLA loc. 2415; LACMIP 5748 from LACMIP loc. 1458; LACMIP 5749 from LACMIP loc. 5202; LACMIP 5750 from LACMIP loc. 5328.

*Etymology.*—*Anglonautilus catarinae* is named for its abundant occurrence at its type locality in Santa Catarina Landing, Baja California, Mexico.

#### Localities

LACMIP 1458.—“Specimens found in the collections with labels that variously read ‘Santa Catarina, Santa Catarina Landing, Santa Catarina Mission, etc.’”

Nautiloid collected by M. L. Webster, April 1961. Rosario Group.

LACMIP 5202.—“Nautiloid from Punta San Jose, Baja California from the upper section of the massive lower mudstone. Second slide south of (fish) camp.”

Collected by Brad Riney. Rosario Group.

LACMIP 5328.—East facing roadcut on El Camino Real, opposite and south of drive to Madonna Hill Guest Home (5392 El Camino Real), just outside of the Carlsbad city limits, San Diego County, California. 1.36 km (.85 mi) north of the intersection of Palomar Airport Road and El Camino Real. Near Letter Box Canyon, San Luis Ray 7.5' Quad. Rosario Group, Point Loma Formation.

UCMP A-8580.—Collected from dark blue-gray poorly cemented massive siltstone exposed along cliff on the beach on the south side of Punta San Jose, Baja California, Mexico. Strata nearly flat lying. Punta San Jose is about 16 km (10 mi) south of Puerto Santo Tomas and Punta China, and is about 36 km (20 mi) west of the town of Santo Tomas. 116.2°W, 31.1°N, AAF Prelim. Base Ensenada (472 B) 1/50,000 (1946), Baja California, Mexico. Rosario Group.



- UCMP A-9122.—Brown silty sandstone dipping 5° seaward between first two main points immediately south of Punta Cabras. Road runs close to low sea bluffs before looping over the northern point saddle to drop down to bay before Punta Cabras. Volcanics faulted in a narrow band just south of (northern most) headland, 31.2°N and 116.5°W, Ensenada Quad., Baja California, Mexico. Rosario Group.
- UCMP A-9545.—North of San Isidro and south of Punta Cabras. Approximately the same area as A-9122. Rosario Group.
- UCMP D-8027.—Near Arroyo El Rosario, Baja California, Mexico. Mexico air photo #127-95. On horse trail northeast of Arroyo El Rosario, immediately north (stratigraphically below) a narrow diabase sill in gray graywacke. Alisitos Formation.
- UCLA 2415.—Sandstone and siltstone on spur about 1.6 km (1 mi) northeast of Lambert Ranch, approximately 2000' long spur is on northwest side of Bee Canyon, 2.6 km (1.6 mi) N., 5 km (3.1 mi) W of southeast corner T 5 S, R 8 W (projected), Lomas de Santiago. El Torto 7.5' Quad., Orange County, California. Williams Formation, Pleasants Sandstone.
- UCLA 3268.—Olive siltstone exposed along the banks of a small gully about 4.8 km (3 mi) northeast of Santa Catarina Landing and 0.4 km (.25 mi) south of the channel of Arroyo Santa Catarina. West coast of Baja California, Mexico. Rosario Group.
- CAS 1431.—Cretaceous fossils near mouth of Arroyo Catarina, Baja California, Mexico. Collected by C. H. Sternberg. Rosario Group.

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